

What is claimed is:

1. A microfluidics device comprising:
  - a plurality of interaction cells;
  - fluid control means including i) means for providing to the interaction cells a preparation fluid, and ii) means for providing to the interaction cells a sample fluid, wherein each interaction cell receives a different sample fluid; and
  - a plurality of microcantilevers disposed in each of the interaction cells, each of the plurality of microcantilevers configured to deflect in response to an interaction involving a component of the sample fluid.
- 10 2. A microfluidics device according to claim 1, wherein the device is disposable.
3. A microfluidics device according to claim 1, wherein the device is reusable.
4. A microfluidics device according to claim 1, wherein the fluid control means includes means for removing a fluid from the interaction cells.
- 15 5. A microfluidics device according to claim 1, wherein the fluid control means is robotic.
6. A microfluidics device according to claim 1, wherein the fluid control means is manual.
- 20 7. A microfluidics device according to claim 1, wherein the plurality of microcantilevers is provided in a planar array of fingers.
8. A microcantilever platform comprising:
  - a plurality of interaction cells, each of the interaction cells including an inlet for receiving a sample fluid, wherein each of the interaction cells receives a
- 25 different sample fluid; and
  - at least one microcantilever disposed in each of the interaction cells, the microcantilever capable of deflecting in response to chemical interaction with a component of the sample fluid.
9. A microcantilever platform according to claim 8, wherein the device is disposable.

10. A microcantilever platform according to claim 8, wherein the device is reusable.

11. A microcantilever platform according to claim 8, wherein each interaction cell further includes at least one outlet whereby fluid may flow out of the cell.

5 12. An apparatus for performing microfluidics analysis, the apparatus comprising:

10 a housing, the housing comprising a plurality of fluid lines, each of the fluid lines including an inlet for receiving a fluid from a fluid pump, and a plurality of control lines in communication with the fluid lines, each of the control lines including an inlet for receiving a control fluid;

15 a microcantilever platform, the microcantilever platform comprising a plurality of interaction cells, each of the interaction cells including an inlet for receiving one or more preparation fluids and a sample fluid, wherein each of the interaction cells receives a different sample fluid, and an outlet whereby fluid may flow out of the interaction cell; and

20 a plurality of valves in communication with the fluid lines for controlling the flow of fluid into and out of the interaction cells.

13. An apparatus according to claim 12, and wherein each of the interaction cells includes at least one microcantilever configured to deflect in response to chemical interactions with a component of the sample fluid

25 14. An apparatus according to claim 12, wherein the control fluid is a gas.

15. An apparatus according to claim 12, wherein the number of the plurality of valves is less than the number of the plurality of fluid lines.

20 16. An apparatus according to claim 12, wherein the number of the plurality of valves is less than the number of the plurality of control lines.

17. An apparatus according to claim 12, further comprising a plurality of expansion chambers for eliminating gas from fluid entering the interaction cells.

25 18. An apparatus according to claim 12, further comprising a waste receptacle for receiving fluid from the outlets of the interaction cells.

30 19. An apparatus according to claim 12, further comprising a reservoir for

sample collection from each outlet of each interaction cell.

20. An apparatus according to claim 19, wherein the sample collected in at least one of the reservoirs is subject to further analysis.

21. An apparatus according to claim 20, wherein the further analysis includes 5 gel electrophoresis.

22. An apparatus according to claim 21, wherein the gel electrophoresis is multi dimensional.

23. An apparatus according to claim 22, wherein at least one of the dimensions is polyacrylamide gel electrophoresis in the presence of a denaturing 10 detergent.

24. An apparatus according to claim 20, wherein the further analysis includes mass spectroscopy.

25. An apparatus according to claim 12, wherein each of the interaction cells includes a plurality of microcantilevers.

15 26. An apparatus according to claim 25, wherein the plurality of microcantilevers is provided in a planar array having a plurality of fingers.

27. An apparatus according to claim 12, wherein the apparatus is mounted on a temperature-controlled platform.

28. A method for identifying an analyte in a plurality of sample fluids, the 20 method comprising:

causing a preparation solution to flow into one or more of a plurality of interaction cells, each of the interaction cells including at least one microcantilever, the preparation fluid including a ligand that binds to the microcantilever and has affinity for the analyte;

25 causing at least one sample solution to flow into the one or more interaction cells; and

detecting a deflection of the microcantilever in each sample solution containing the analyte.

29. A method according to claim 28, wherein causing a preparation solution 30 to flow into one or more of the plurality of interaction cells includes causing a linker solution to flow into one or more of the interaction cells, the linker capable

of binding the ligand to the microcantilever.

30. A method according to claim 28, wherein causing a preparation solution to flow into one or more of the plurality of interaction cells includes causing a wash solution to flow into one or more of the interaction cells

5 31. A method according to claim 28, wherein causing a preparation solution to flow into one or more of the plurality of interaction cells includes causing a receptor solution to flow into one or more of the interaction cells.

32. A method according to claim 28, wherein causing a preparation solution to flow into one or more of the plurality of interaction cells includes causing a

10 buffer solution to flow into one or more of the interaction cells.

33. A method according to claim 28, wherein the number of sample solutions equals the number of interaction cells.

34. A method according to claim 28, wherein the number of sample solutions is less than the number of interaction cells.

15 35. A method according to claim 28, wherein the ligand is selected from a group consisting of a protein and a nucleic acid.

36. A method according to claim 35, wherein the nucleic acid is RNA.

37. A method according to claim 35, wherein the nucleic acid is DNA.

38. A method according to claim 35, wherein the protein is an epitope.

20 39. A method according to claim 35, wherein the protein is an enzyme.

40. A method according to claim 35, wherein the protein is a polypeptide.

41. A method according to claim 28, wherein the analyte is selected from a group consisting of all or a portion of a nucleic acid and a protein.

42. A method according to claim 28, wherein the analyte is a hormone.

25 43. A method according to claim 42, wherein the hormone is selected from a group consisting of a steroid and a polypeptide.

44. A method according to claim 28, wherein each of the ligand and the analyte are selected from a group consisting of an antibody and an antigen.

45. A method according to claim 28, further comprising mounting the

30 interaction cells on a temperature-controlled platform.

46. A microfluidics device comprising:

a plurality of interaction cells, each of the interaction cells being configured to receive at least one microcantilever; and

fluid control means including i) means for providing to the interaction cells a preparation fluid, and ii) means for providing to the interaction cells a sample fluid, wherein each interaction cell receives a different sample fluid.

5 47. A microfluidics device comprising:

a housing, the housing comprising a plurality of fluid lines, each of the fluid lines including an inlet for receiving a fluid from a fluid pump disposed within the housing, and a plurality of control lines in communication with the

10 fluid lines, each of the control lines including an inlet for receiving a control fluid;

a microcantilever platform, the microcantilever platform comprising a plurality of interaction cells, each of the interaction cells including an inlet for receiving one or more preparation fluids and a sample fluid, wherein each of the interaction cells receives a different sample fluid, and an outlet whereby fluid

15 may flow out of the interaction cell; and

a plurality of valves in communication with the fluid lines for controlling the flow of fluid into and out of the interaction cells.

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